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SPECIAL FEATURES

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ANALYSIS OF AIRCRAFT ACCIDENTS
AIRSHIPS FOR TRANSATLANTIC SERVICE
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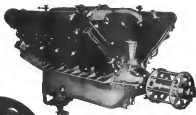
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No. 13

A National Crisis

MAJOR GENERAL MENONDER'S request to be relieved as Chief of Air Service brings to an immediate issue a vital national problem—whether our Army Air Service is to be derided by practical flying men or not. General Menonder naturally wishes to conclude his army career with the troops. It is in that field that he has won great distinction. He very naturally and properly may feel that his work as commanding the Air Service is finished, and probably he realizes that he can make no further contribution to the development of the Air Service.

The Army Air Service in the past has been directed by non-flying chiefs. Although this course may have been necessary, it has not been satisfactory, and its continuation in the future will continue and accentuate the embarrassments of the past.

The Secretary of War would be very properly satisfied if he appointed as Chief of Staff Auxiliary anyone but a Chief Artillery officer. It is impossible to think of anyone in the position of Chief Signal Officer except an officer who has been technically trained and who has gained distinction in that specialty. It is true that the Secretary of War recognized the necessity of relieving as Chief of the Army Air Service, a flying officer.

All countries recognize aircraft as indispensable weapons. Other nations, under the direction of flying officers, are building up air forces and aerial reserves as their best line of defense. Supremacy in the air is the new watershed. For winning development in order was almost and gradually everywhere except in the United States it is under the direction of officers who know from their own experience in the air, the possibilities and limitations of air power. The most competent flying men, officers of particular achievement have been placed in direct charge of this highly specialized work.

How can we expect to develop the proper regard in the personnel of the Army Air Service, except under the leadership of a chief? How can we expect the Army Air Service to take its proper place among the armed forces unless the Chief of the Air Service represents the flying personnel?

The resignation of Major General Menonder as Chief of the Army Air Service presents a crisis in our plans for national security. It opens an opportunity for the Secretary of War to correct a condition which has created some of the embarrassments of military aviation in this country and which, more than any other single factor, has been responsible for our tardy development in the air.

Flying as an element in national defense dates practically from 2000. In its inception it was necessarily placed under the direction of the older services. By the close of the World War it had won recognition as all the major belligerent nations as a distinct arm requiring control by men who were themselves who thought of fighting in terms of the air.

During the last administration, the Army Air Service was under two non-flying officers—General Foster, of the Signal Corps and General Isely of the Cavalry. At the first, in France, the Air Service of the A.E.F. was under a flying officer, General Mitchell. At the close of the war, and before Mitchell's return, General Keady was appointed as chief of military aviation in this country, by General Menonder, of the Infantry.

General Menonder now retires voluntarily. General Mitchell has been his assistant for several years. To his practical experience in the air in France he has added administrative training under General Menonder. The needs of the service, judged from recent developments, requires a flying officer in the vacancy created by General Menonder. The time is the Air Service. They want an attempt to command them. If a flying officer is not chosen, our aerial defenses will suffer. The Secretary of War is urged to consider this and to make the opportunity by relieving General Mitchell in the position of chief.

Progress in Commercial Airplane Design

THIS article on single engine cabin airplanes which is printed in the present issue affords a valuable indication of the manner in which commercial airplanes have increased in efficiency since the Aviatrice. While a full discussion of this question would necessarily involve a detailed comparison of the constitutional features of each machine, the characteristics listed in the table are sufficient to enable us to draw certain conclusions as to the points which are mainly instrumental in improving the efficiency of commercial airplanes.

Taking into consideration only the airplanes specially designed for commercial exploitation, and actually built, we find that of the six machines having the highest figures of merit four are monoplanes and two are biplanes. Taken in their respective order of merit, they are the Junkers J1-E, the Spad R-23, the Fokker F-2, the Dornier C-2, the Curtiss Eagle III and the Juergel. That a cantilever monoplane should hold this list is but natural in view of the greater efficiency of its wing arrangement and low parasite resistance. What is however surprising is to find the Spad biplane more efficient than the Fokker and Dornier monoplanes. The only acceptable explanation of this fact seems to be that the Spad overcomes the inherent interference of a biplane arrangement by a peculiar setting of the wings, consisting of a swept-back top plane staggered forward over a small straight bottom plane. Furthermore, the Spad is much more carefully streamlined than either the Fokker or the Dornier cabin airplanes, in which straight knee and angle predominates, whereas the Spad has a circular section fuselage.

The Problem of Fuel for Aviation Engines *

Four main factors must be considered in the choice of a fuel for aviation engines: (1) composition, (2) quantity available, (3) price of per heat unit, and (4) facilities for maintaining stocks at aerial ports. Consideration must also be given to the engine modifications required by a change in fuel, and the problem of carrying the fuel aboard aircraft and supplying it to the engine.

Fuel in the gaseous form cannot be considered on account of the space occupied and the weight of the container for such a fuel. Solid fuels which might be pulverized, or which might be dissolved in a liquid, could be considered. For liquid fuels an alkali fuel might be used. Liquid fuels of high caloric value per unit of weight are best. An ideal fuel would be of such a nature that it would not evaporate and decompose in time and so at least would not form a mixture which would explode easily, but which could be mixed and stored satisfactorily in the container and would form a sufficiently inflammable mixture in the engine cylinder. These conditions have not yet been fulfilled by any of the existing fuels for internal combustion engines.

When considering the fuel mixture it is especially important that any possibility of the separation of the fuel and air either in the manifold or cylinder, should be eliminated. There are two fundamental ways of doing this: by (1) the atomization of all fuels and speeds, and (2) vaporization of the whole or the main part of the fuel.

The liquid fuel vaporization is best done after the fuel has left the nozzle of the fuel tank at which it is surrounded by the air for the combustion which must also supply the heat for vaporization, when there is no heating of the carburizer or manifold.

Two methods may be employed in the use of fuels with high boiling points, either or both of which may be applied separately or simultaneously: (1) the atomization of the liquid at all levels, and (2) the atomization of the temperature of the fuel mixture and the surrounding walls about the temperature of the fuel-air mixture. This mixture in the temperature of the mixture and walls is difficult when starting the engine cold as it requires time to obtain heat from the mixture and transfer it to the mixture. The most convenient method is to start with a fuel of low boiling point and raise the desired temperature as required.

Tests of the possibility of starting fuel with a high boiling point by means of injection into the combustion chamber with preheated air show that the operation of the engine is at least reliable when injection was completed just before ignition.

At present too little is known about premature ignition to enable a clear and unclouded judgment as to its cause to be given. Experiments show that totally different degrees of atomization are necessary in the same engine for different fuel mixtures. The risk of premature ignition decreases as the weight of charge is reduced although the compression ratio which determines the temperature at ignition and the composition of the mixture are not thereby affected. Experiments show that the mixture should be far less moist and so premature ignition less probable. Petroleum and gas oil, for which the temperature must be raised when they are utilized, present particularly low spontaneous combustion temperatures so that there are two reasons for using a low compression ratio with these fuels.

An essential provision for the safe operation of engines with preheated fuel mixtures applied to the engine by means of a special injection port is that the compression temperature should range for lower than that of spontaneous ignition under all conditions.

Ignition velocity plays an important part, especially in high speed engines, and is as yet insufficiently understood. As the ratio of air to fuel increases the ignition velocity first in-

creases steadily, then, at some stage, as with ordinary gas, increases rapidly, while in others, especially with gasoline and kerosene, it decreases slowly.

Consideration of the various aspects of the fuel question leads to the conclusion that the combustion type of engine should not be used for aviation or light, high-speed engines designed for the use of fuels of high boiling point. Rather should the aviation engine be selected from the ignition engine class with the best possible atomization and compression low compression ratio. In this case, a mixture of atomization should be made of all the important characteristics of fuels, so that the best of all aviation engine types may reach the same stage of development which distinguishes the best light oil engine engines from all other combustion engines, namely, (1) a pressure compression of 0.6 to 0.7 lb. per sq. in., (2) a mean useful pressure of 125 to 142 lb. per sq. in., and (3) a power output of 3.5 to 3.3 lb. per hp.

Chicago Air Race

An interesting new race took place on September 5 at Chicago. The race was limited to machines of the Curtiss XF type with a 30 hp. engine made by the same company. There were eleven entries and the course, starting from the airfield of the Aero Club of Illinois, led to Clarkston Field to Clarkston, Tenn. Field to Douglas St. Field to Clarkston Field to Clarkston Field and returns to the starting point. The winner was David Bickerton who completed the course in 44 min. 36 sec. An interesting entry was that of Charles Barkman who, though over 60 years of age, piloted his machine in the race.



MR. CHAS. BICKERTON, RECENTLY APPOINTED DIRECTOR OF THE BUREAU OF THE U. S. AIR FORCE, AND HIS AIRCRAFT.

Based upon the most trustworthy available information, it is estimated that 1,500 aircraft are engaged in commercial flight in the United States today. It is believed conservative to estimate that these craft have a total of 1,250,000 miles from Jan. 1 to June 30, 1921.

One of the several handicaps to the normal development of transportation by air is the belief that it is extremely dangerous. This belief is strengthened by the knowledge that no law, or regulations governing such traffic exist, and, further, according to the extraordinary publicity which is given such flying accidents, military, naval, postal or civil.

Loss of Official Machinery

In preparing an analysis of the safety of flight, the Association has met with the greatest obstacle—the lack of official machinery, with which to obtain thorough and authentic information, due, in turn, to the lack of an Aerial Code. This necessarily must eventually be known in mind, as voluntary reports to this Association, or accounts clipped from newspapers, may or may not be reliable. Nevertheless, we have succeeded in getting the most out of the material at hand.

Our tabulation shows that, in the first six months of 1921, there were forty serious accidents in civil flying, not including accidents to Government-owned machines. Ten of the forty occurred in January, one in February, two in March, six in April, sixteen in May and thirteen in June—progressing as the flying season advanced. The accidents were reported to the Bureau of Aeronautics by the following:

The forty accidents resulted in death to fourteen persons and injury, more or less serious, to fifty-two. It is believed accidents there were no casualties. The fourteen lives were lost in the accidents, and twenty to the fifty-two persons were injured in twenty accidents.

Statistics for Safe Flying

Before proceeding further with the analysis it must be noted that, in safe flying, there are the following requirements:

- 1—A machine sound, aerodynamically and structurally.
- 2—An engine of sufficient power and which operates satisfactorily.
- 3—A competent, conservative pilot and navigator.
- 4—All ports and emergency landing fields, sufficiently clear together to insure flight to safety.
- 5—Adequate weather forecasts specialized and adapted to the needs of flying.
- 6—Adequate air chart or air routes.

Accidents Attributed to Pilot

Each of the forty accidents recorded was caused by deficiency in one or more of the above elements. Seventeen were attributed to the pilot, perhaps through carelessness, perhaps misperception, perhaps bad judgment combined with other factors. There is no doubt that a good pilot can guide a poor machine to safety with greater ease than a poor pilot can guide a good machine to safety. Therefore, it is the very top of the list of Governmental needs to place the education and knowledge of pilots. During the war more than 7,700 trainees were trained to fly. The art of flying can be retained perpetually without practice, and so it is maintained at a high degree of competency without regular instruction. The case is true of aerial navigators. Both pilot and navigator (many times they are identical) are of great importance in safeguarding the lines of travel by air.

Indecision Landing Fields

The accidents are attributed to inadequate landing fields or to the fatal lack of landing facilities. Here is a danger directly exposed upon the Federal Government. During the war the Army and the Navy acquired many terminals, most of which have since been abandoned. The fragmentary commu-

nication has been slightly aided to by the Air Mail, municipalities and private enterprise, but the United States is today woefully lacking in air ports far across the 1,200 craft in operation. A survey made by the American Aeronautics Club, in the United States and the possessions, shows that there are only 371 air and water aerodromes, many of which are concentrated in certain localities. Of the 371 land air ports, 145 are controlled by municipalities, 48 are privately owned, and the others are a part of the Army or Navy, or are owned by the Air Mail.

What a terminal is to a railway and a harbor to a steamship line, an airport is to an aerial company. Safety in flight can not be appreciated until a central authority organizes air ports of different grades and classifications and their regulations, and such a central authority is the Air Mail. What a terminal is to a railway and a harbor to a steamship line, an airport is to an aerial company. Safety in flight can not be appreciated until a central authority organizes air ports of different grades and classifications and their regulations, and such a central authority is the Air Mail. What a terminal is to a railway and a harbor to a steamship line, an airport is to an aerial company. Safety in flight can not be appreciated until a central authority organizes air ports of different grades and classifications and their regulations, and such a central authority is the Air Mail.

Lack of Weather Reports

While only two accidents are attributed to the lack of weather reports and two to the lack of clearly defined routes or limitations in landing between or over other craft, it is certain that great importance can not be developed from these factors are met. As an illustration—two of the worst accidents in our flying history are attributed to these causes. As one was moved and the other, they can not be included in the civil flying statistics, although they were reported by flying reports as though they had occurred in private individuals.

On March 3, a naval aircraft, according to press reports, disappeared on its last flight, and it is believed that the pilot or the battery had no business on it. In either event, the fatalities would have been prevented had proper authority existed.

On May 28 a large Army plane crashed at Morgansville, Md., killing six aviators, who included some of the best known figures in military and civil aviation. According to the report of the Inspector General's investigation, the driver was not in the cockpit, but in the machine, or the person on the part of the pilot, but to the terrible storm which the day flew and of which the pilot had not been warned. The investigation also referred to the fact that "it was found to be better to install a system for introducing of weather conditions and weather forecasts, between flying fields maintained by the various services, including Army, Navy, Mail Service and Coast Guard Service." It was further stated: "Inasmuch as information of weather conditions on a continuous basis is essential to the safety of flying, the use of the engine and plane; and it is highly desirable that, as far as possible, except in emergencies, no cross country flights should be undertaken until available information of conditions on the way has been obtained."

Commercial cross-country or private flights, it is evident, can not be encouraged with safety until there is full protection afforded by establishing good weather reports and communicating them with the various Government reports.

Inspection an Imperative Need

Equal in importance with increasing the qualifications of pilot and navigator is inspection of aircraft and engines. Out of the forty accidents, eleven may be considered as fatal which proper inspection probably would have revealed—three concerned the plane, six the engine and two an accessory. In many instances it is found that the engine is blamed when really it is an accessory that is at fault. An analysis of the Federal Government is the best way.

When it is remembered that operators of motor cars are required to qualify and that motor cars are periodically placed under repair inspection, it is surprising to learn that engines can take any sort of flying machine into the air in the present

* Abstract of a presentation by the Bureau of Aeronautics, U. S. A. C., of a paper presented at the National Conference on Aeronautics, held at the National Academy of Sciences, Washington, D. C., on April 10, 1921.

Airships for a Transatlantic Service

By Ralph Upton

Trans-oceanic travel, it is not only the most attractive field for present-day development, but it also furnishes the most interesting, versatile comparisons, for airships and steamships are both displacement types of vessels subject to the same fundamental laws. Hence, no final effort will be devoted toward various factors common to both, from which direct analogies can be drawn.

Resistance. The ultimate end of nearly all final resistance is to best developed in the vicinity of the hull, but in its location on the vessel it may be conveniently divided into three distinct areas, or that caused by frictional drag on the sides of the vessel.

1. **Displacement resistance,** or that caused by displacing a mass of fluid from its original position and setting it in motion. This drag may be further divided into eddy resistance and that due to disturbance of the streamlines.

2. **Wave resistance,** due to the energy expended in forming surface waves.

For properly designed boats and airships at low speed, (1) is the largest. Theoretical considerations, based on the important fact that the coefficients of skin friction for air and water are almost exactly proportional to their densities for streamlined body shapes. It is easily proven that (1) falls in the square law. This is also borne out experimentally. A rough general formula for the first two items would be, Resistance $R = CV^2 + KV^3$, where V is the speed and C is the density of the fluid, K is the density of the fluid, or the displacement in cu. ft. C , K , V , and R are constants. The third class of wave resistance covers only a very small, although important, we will neglect it for the present.

For constant speed and similar shapes using the above formula, the fuel consumption will vary as $HP \propto R \propto V^3$. As it is well known a steamship hull displaces its own weight of fluid and thus is an equally true test for air and water. Reputable authorities give $R \propto V^3$ for air and $R \propto V^3$ for water.

Substituting above, $HP \propto V^3$ for air and constant weight.

$HP = \frac{W}{V}$

for a 3-ton airship 975 lb. per cu. ft., and 2 for water equals 610 lb. per cu. ft. The ratio for the horsepower for the two

$HP \propto \frac{W}{V}$

falls well as $\frac{1}{V}$.

HP, Water

For the sake of simplicity we have used a rather crude formula so that we must now correct the errors involved in so simplifying the matter so far as to be accepted as accurate.

First it is impossible to obtain exact dynamic similarity for two different sizes of the same speed, but the coefficient can be very nearly satisfied by giving the smaller a speed in the ratio of the boat, thus reducing its capacity. The fact that a boat displaces water chiefly in the sides is another error in the same direction. The skin friction per sq. ft. is less for a long narrow than a short one. Wave resistance which is the most important factor in high speed boats is entirely lacking in the case of airships. It might be said that in water, displacement and wave resistance overlap to a great extent, that as part of the resistance which is commonly in the form of displacement is transformed into waves. But this does not alter the fact that we have neglected a factor of considerable importance. Other errors are weakness of the coefficients, and the fact that a small part of the hull is flooded by the water. In examining these elements we find that all but the last two are distinctly in favor of the water rather than air. After giving everything due weight it appears probable that the result obtained above should be increased a little. We are now able to state a law which is of the very greatest importance to the development of airships.

A given weight may be supported by and driven through the air at about 1/10 the energy required to drive it in a fluid body through water at the same speed. In other words if we take a boat and, keeping it at the same weight, change it into a float in the air instead of the water, it can then be driven at about 1/10 the expenditure of power.

Partial Space. Another great economic advantage of the airship and one which would speed strongly in passengers is that all the weight left may be utilized for first class passengers. An open steamship, which is almost entirely open, has only a small part of the total carrying capacity available for the first class stateroom. Other less desirable parts of the ship are devoted to second class, and the latter usually forming by far the greater bulk of the ship. The result of these conditions is that it is found impossible to install large and heavy staterooms, and indeed with their large accompanying weight of air. It is even said that a gain in economy would result from using several combinations of engines, but there would be no doubt of it if the space saved could be given over to first class passengers. In the case possible it is equal gain in strength and weight, with no loss for the sake of an increase in carrying capacity. With an airship the entire hull is surrounded by air, and there is plenty of room of air around to get all the passengers which it is possible to most comfortably, for there is no appreciable motion. Every particle of weight saved by the power plant or in any other way can be used directly for first class passengers.

Ex-Displacement. The freedom from motion and the consequent elimination of seasickness would be one of the most pleasing properties of the air route to the average passenger. The airship will of course have its economic disadvantages, presented among which are:

1. Its large size compared to the steamship, meaning in consequence, increased cost. By a comparative calculation similar to the one just made for resistance it may be shown that, using the same materials and an equal gain in strength, the airship would be approximately ten times as heavy as the equivalent boat. This impossible result is greatly modified by the fact that a boat has to be made to stand the heaving of the waves and that in the case of an airship the motion is prevented and in an airship there is no motion.

2. The weight of the hydrogen necessary to secure buoyancy is about 1/14 of the total weight.

3. The expense of the hydrogen. Contrary to popular opinion, hydrogen is an extremely small quantity compared to the cost of fuel in a large airship.

4. The difficulty of docking, handling, ballast, cooling water, etc. These are not much more than a nuisance, but they would be worked out satisfactorily.

5. Wind. This is an item which cannot be overlooked, in fact it appears to be the critical factor in the design of the airship. It is not true that wind automatically increased the difficulty as a speedometer more considerable, and more common method of travel than is ocean steamship. There is no doubt that it is a very serious study of weather conditions over the aerial before starting a regular transatlantic airship line. It is not because winds have any appreciable effect on the stability of the airship (as they have on the steamship) or because they cause a change of altitude in the airship. The question here is merely how they affect the speed, but this is so important that the success or failure of a trip almost depends on it.

It is in fact the design of the first attempt at transatlantic flight. Mr. H. G. Wells explained the situation very clearly and well "If a steamship encounters a gale blowing directly into her bow, as a rule the progress of the ship

is not interrupted. It may be necessary to reduce the speed and therefore the rate of progress, but the vessel will not stop, but gradually the ship proceeds on her way. If the storm is unusually violent and the sea runs very high, the worst that usually happens is that the ship may be to for a few hours all the work of the ship is suspended and better conditions return, when the voyage is resumed.

"The steamship during such circumstances drifts but a few miles out of her course; she lies in without expenditure of power, thus saving fuel in the long run. In the case of an airship it makes little difference from which point of the compass the storm blows, and no very serious difference how long it continues. The explanation is obvious, the steamship is affected in its movement and course only to a very small extent by the wind, any one or two or perhaps five per cent, of the force of the wind, regardless of whether the wind is ahead or astern or headwinds on. The craft is sailing in the water, not in the storm.

"But it is altogether different with the ship of the air. In navigating the air alone, it is a part of the air, and currents

which it would equal to that of the wind under these conditions it can be shown that its true average for the entire trip will be — or a little less than 1/10 of the speed in still air."

Analysis of a Particular Case. As a practical example, let us assume a route between New York and London by an airship of the following performance:

Length, 200 ft.
Diameter, 15 ft.
Volume, 8,000,000 cu. ft.
Displacement, 264 long tons
Fuel speed (through air) 54 knots at a brake horsepower of 1200.
Fuel consumption 0.8 lb. per hp. hr.
Lift available for fuel, cargo and passengers, 327 tons, which we will call the "netted load."

The assumed weather conditions for transatlantic flight have been carefully studied using mainly the data collected by Lawrence H. H. and applying it to the performance of the



Map Showing Proposed Airship Route from New York to London.

in the air over the open sea, not merely one or two but perhaps five per cent of their force, but all of it, one hundred per cent. Thus we find that while the wind seems little to the rider of a steamship of high power, and considerably more to the sailor of a sailing vessel, to the driver of a ship of the air it is everything."

General Predictions. Several important facts to be derived from the fundamental information are as follows:

1. A wind blowing at more than 90 deg. to the course is always unfavorable.
2. A wind at less than 30 deg. may be favorable and it may not, depending on its force and velocity.
3. A wind of very high velocity, compared to that of the ship, is always unfavorable except when the angle is 90.
4. If the normal velocity of the ship is less than that of the wind, it can be held to its course only when the wind is from ahead.
5. If the wind velocity equals that of the ship, it will be favorable only when blowing within 60 deg. of the course.
6. From 90 to 180 deg. the ship can be held to its course but there will be no progress.

The problem for any particular route involves plotting the probable wind currents and choosing as accurately as the observed data will allow, applying the results to the laws of the ship, and finally to the position, giving the medium of the ship. A very simple illustration will suffice to show the method.

Suppose that on investigating some proposed route we find that the wind always maintains a fairly constant velocity, but changes continuously in direction, that it is equally likely to blow any part of the compass, and that it is impossible to predict its direction in advance, that if the trip is long enough, we can only assume that we shall get an equal number of our direction as another. If the normal speed of the

present ship. Detailed tables and charts cover detailed conditions of which only the general conclusion is here presented.

Referring to the attached map, the dot dash line shows a direct or great circle flight from New York to London, as the great distance of just north of east. Along this particular route is found a greater percentage of winds tending to assist in the east bound flight, with these winds becoming more favorable at higher altitudes. Transatlantic flights are shown along this line at an altitude of 3300 ft., above the sea. In the attached tables it is noted that with full power, an average speed during the winter and summer months of 60 knots can be expected, so the entire trip of 2600 miles can be completed in 47 hr. on a fuel consumption equal to 37 per cent of the entire netted load.

The altitude of the most favorable winds (for east bound trips) is everywhere higher than the 3300 ft. limit, but cannot immediately be taken advantage of when starting out with a full load. As the trip progresses and fuel is used up, it is possible to go to higher altitudes and thus increase the average speed. Improved speed can also be obtained by the pilot's taking advantage of the most favorable atmospheric conditions. In the tables attached no account has been taken of the possibility of better speed at higher altitudes, nor of the pilot's use of the wind, so to use the actual existing winds to the best advantage. Hence, the figures here given are thought to be conservative.

For the return trip along the same route the minimum of updraft winds are found nearly as on land. Referring again to the tables it is found that the return trip can be made in a direct line the same as for the east bound trip, but at an average speed about 40 knots, which means a 50 hr. trip, and fuel consumption equal to about half the useful load (This percentage could be considerably reduced by stopping

Switzerland Wins G. S. Helium Race

The 1933 Gasless Bennett Helium Race, the start of which was given on Sept. 25 at Brussels, Belgium, was won by the Swiss pilot Capt. Paul Amundsen, who landed his balloon at Lonsdale Island, off the east coast of County Dublin, Ireland. Bernard von Hoffman, pilot, and J. G. McKibben, aid, representing the United States, secured the next greatest distance, but they probably lost several miles as their balloon fell into the Irish Sea about 15 miles off Dublin, where they were rescued by a passing steamer. The assistance rendered would probably diminish their score. Owing to inclement weather it was not possible to see when Swedish pilot sports at land it is not yet possible to see when Swedish pilot. The two contestants for first place are Ralph H. Vance (United States), who landed at Binnick, Cornwall County, having covered 430 miles in 37½ hr., and Ernest Allen (Great Britain) who landed at Porthgallow, Pembrokeshire County.

The complete list of the aircraft who started from Brussels, in the order of the start, with the name of their balloon, and landing place follows:

1. Lt. Col. J. D. Derrville (Great Britain) "Pender III". Landed at Gwent, Wales.
2. Maurice Bemeret (France). "Pender". Landed at Pender, Wales.
3. Ralph Vance (United States). "Aero Club of America". Landed at Binnick, Cornwall.
4. Col. C. Harcourt (Italy). Landed 25 miles SW of Swansea, Wales.
5. Edwards Maguire (Spain). Landed 25 miles from Cardiff.
6. Capt. Paul Amundsen (Switzerland). Landed at Lonsdale Island, Irish Sea. Winner.
7. Lt. Ernest Amundsen (Belgium). "Belgian III". Landed at Porthgallow, Pembrokeshire.
8. Ernest Allen (Great Britain). "Margaret". Landed at Porthgallow, Wales.
9. Jules Dubois (France). "Marie". Landed at Dolgelly, Wales.
10. Wade T. Van Orman (United States). "City of Akron". Landed 9 miles NW of Exeter, Devonshire.
11. Major George Yell (Italy). "Foufale IX". Landed at Aberystwyth, Wales.
12. Lord F. Lubbock (Belgium). "Edgar-Ten". Landing not known, but did not cross Irish Channel.
13. Charles Crookson (France). Landed at Brighton, England.
14. Bernard von Hoffman (United States). "City of St. Louis". Landed in the Irish Sea 15 miles off Dublin.

New French Airway Guide

We are in receipt of a new French aviation guide called *Aéro-Industrie*, which is published by Ed. Bloudin & Hanger, 7 rue St. Lazare, Paris, and which gives detailed information on all the public air transport services operating in Europe. It is indicative of the enormous development of foreign commercial aviation that this information takes up eight pages. The information given, with regard to the services, is given in tabular form, and includes the names of the companies, the routes, the aircraft, the number and type of aircraft in service, is of the most comprehensive kind. The value of the work is greatly enhanced by the inclusion of numerous maps showing in detail the course of the various services and a general geographical map of Europe.

Aéro-Industrie is published under the auspices of the French air ministry, and is prepared in collaboration with Colonel Narbonne, director of the air navigation service of that ministry.

American Machine in Canada

In view of the fact that the Canadian government is providing immediate facilities for the United States aircraft operating in Canada it is interesting to note that the latest report of the Canadian Air Board shows one machine from the country operating under a temporary Canadian license. The machine is an HSEI, biplane, No. 4296, belonging to the Pacific Airways Ltd., Seattle, Wash., and is, in accordance with the International Air Regulations, N.C.A.M.

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